

J. G. JONES.
COATING MACHINE.
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1,309,858.

Patented July 15, 1919.

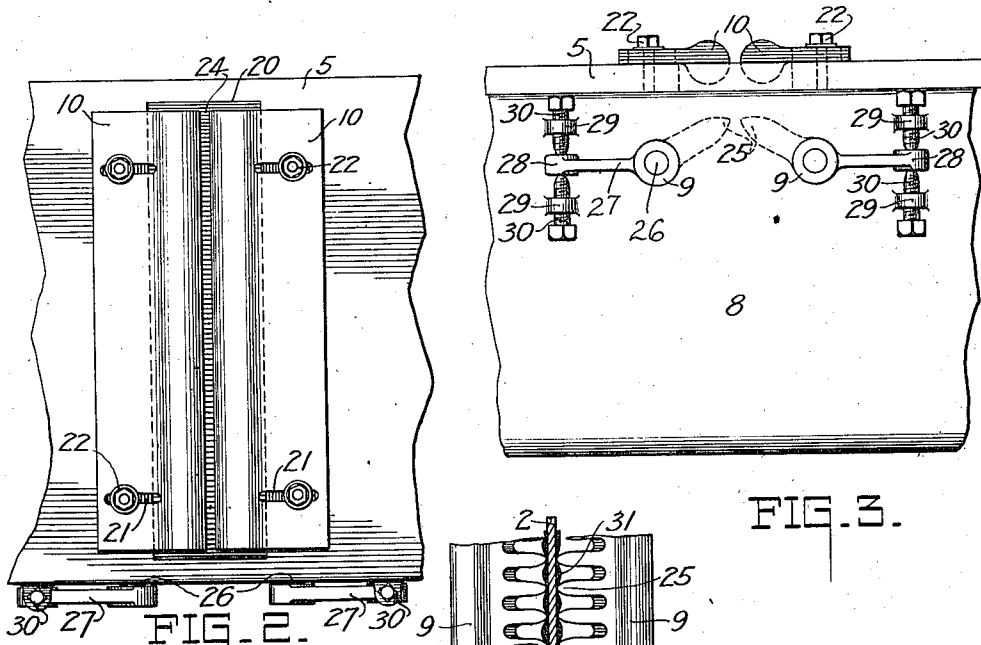
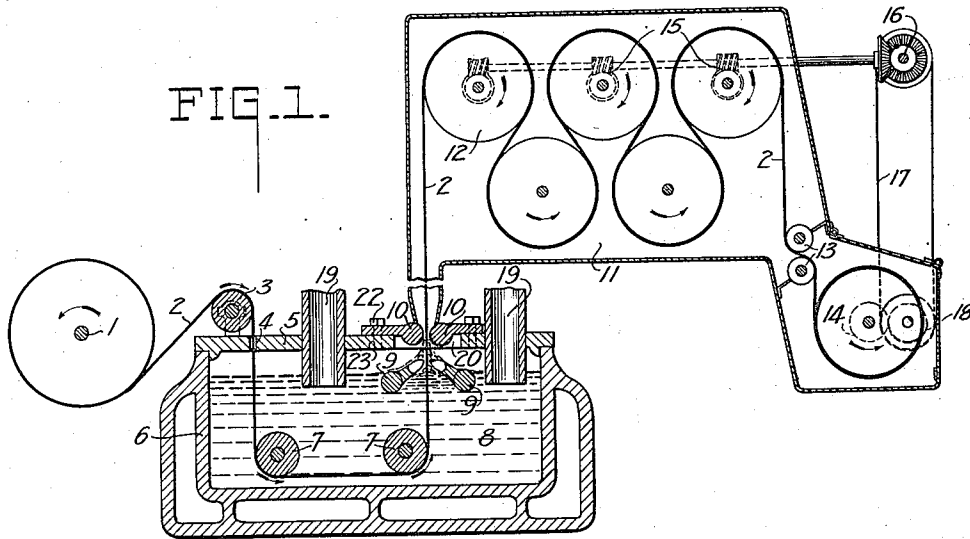
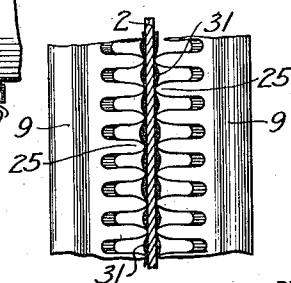


FIG. 3.

WITNESSES:
Charles H. Stewart
Helen M. Frazer

FIG. 4.



INVENTOR.
John G. Jones,
BY *Ray L. Stinchfield*
Newton A. Perrius
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN G. JONES, OF ROCHESTER, NEW YORK, ASSIGNOR TO EASTMAN KODAK COMPANY,
OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

COATING-MACHINE.

1,309,858.

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To all whom it may concern:

Be it known that I, JOHN G. JONES, a citizen of the United States of America, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Coating-Machines, of which the following is a full, clear, and exact specification.

This invention relates to an improvement in that form of apparatus for applying a coating of liquid composition to both sides of a flexible band of sheet material in which the band is first drawn through a bath of the coating material whereby it is coated on both sides, and thence drawn through a drying chamber; and in particular it relates to a new means and method for insuring that the coating on each side of the band is of the desired thickness and that it is uniformly applied. The desired end is obtained by passing the freshly coated band between scrapers which remove excess coating and spread the remainder uniformly and evenly. It is necessary if the coating is to be the same thickness on each side of the band that the band pass exactly midway between the scrapers and this is insured by providing two adjustable guiding combs which are accurately placed so that they contact each side of the band as it approaches the scrapers and position the band properly. The guiding combs perform a secondary function in scraping portions of the applied coating from the band so that the amount of coating left in streaks is but slightly in excess of the amount necessary for the desired final coating. The scrapers spread this evenly over the surfaces and prevent passing of the excess.

While the apparatus was devised primarily to meet the difficulties attendant upon coating a woven wire fabric uniformly, as in coating it with cellulose acetate, cellulose nitrate, or any similar composition, I contemplate its use in the application of coating material of any kind or composition to any form of flexible sheet material, such as paper, any form of fabric, celluloid, etc.

It is to be understood that considerable latitude is possible in the structure used, any equivalent elements that perform the functions attained being contemplated as within the scope of my invention.

An illustrative embodiment is shown in the attached drawings, in which—

Figure 1 is a view partly in section and partly diagrammatic of the coating apparatus as a whole;

Fig. 2 is a top view of part of the coating vessel;

Fig. 3 is a side view of a part of the coating vessel, and

Fig. 4 shows a portion of the centering bars as they operate on a band.

1 represents a roll on which is wound a band of sheet material 2, which passes from the roll over an idle guide roll 3, through a slot 4 in the cover 5 of a vessel 6, containing a quantity of liquid coating material 8, about idle guide rolls 7 in the bath, between two guiding comb bars 9, between two scraper bars 10 mounted on the cover 5, thence into a drying chamber 11, about a plurality of driven drying rolls 12, over two idle guide rolls 13 and is finally wound on the frictionally driven take up roll 14.

The vessel 6 is of a familiar type having walls with chambers for the passage of fluid to maintain the bath at the desired temperature. Ducts 19 supply coating liquid as needed from an appropriate reservoir or other source of supply, a duct discharging the liquid on each side of the band as it passes through the vessel to insure an even supply at all times to both surfaces. The drying chamber is also of a familiar type, the drying rolls 12 being interiorly heated in any well known way and positively driven at a predetermined constant speed, as by worms 15, actuated from the power shaft 16, which also drives by a belt 17 over appropriate pulleys and by friction pulleys at 18, the take up roll 14.

The drying and take up apparatus are shown diagrammatically only and are not in scale with the coating vessel and its parts. Their particular construction is not material to my invention and they are shown in order that the functions of my improvements in their relation to the apparatus with which they are used may be perfectly clear.

In the cover 5 of the tank 8 is a rectangular opening 20 on either side of which are screw holes 23. The rigid scraper bars 10 are mounted so that one edge of each overlies the opening 20 leaving a narrow

slit 24 between them. The bars have slots 21, and machine screws 22 fitting the screw holes 23 permit adjustment of the scraper bars so that the slit 24 may be of the desired width.

The comb bars 9 are rotatably mounted in the walls of the vessel, an extension 26 from one end of each bar extending through a stuffing box in one wall and having rigidly mounted on its end a member 27, with an extension 28. Lugs 29 are mounted on the wall of the vessel 8 and set screws 30 mounted in these lugs contact with the extension 28 and permit angular adjustment of the centering bars 9 so that their teeth may be set at the desired distance apart. They are placed closely beneath the scrapers.

The vessel 8 is filled with the liquid coating material to a point at about the level of the centering bars and the band of flexible sheet material is passed through the whole apparatus in the course outlined. The scraper bars are adjusted so that the slit between them will be of such a width as to permit passage only of the desired amount of coating on each side of the band, the excess being scraped off and flowing back to the bath. The location of the slot between the scraper bars will be fixed as nearly as possible in line with the common tangents of the rolls 7 and 12, but as there is a long stretch of band, it is impossible to center the slit 24 with the desired accuracy, particularly as the band will unavoidably sway more or less so that without other centering means the coating will not be uniform on the two surfaces.

The centering comb-bars 9 are then adjusted so that the teeth 25 just contact the surfaces of the band and guide it accurately midway between the scraper bars. As the comb-bars 9 are close to the bars 10, the band will not sway as it passes between the scrapers. The teeth 25 will scrape off portions of the coating leaving adhering to the band longitudinal streaks of liquid 31. The amount still adhering will be in excess of the amount needed to coat the entire surfaces. Fig. 4 shows the band passing between the teeth and the disposition of the coating on the surface. The streaks 31 are so thick that they cannot pass the scrapers, which flatten them out, forcing the material into the hollows between them, leveling the coating and removing the excess so that on each surface of the band as it leaves the scrapers there is an evenly spread coating, the coatings being of equal and of uniform thickness, all traces of streakiness being gone.

The guides not only center the band but improve the quality of the coating in that much of the excess coating which otherwise would be brought to the scrapers is removed before that point is reached and there is no

clogging of a large excess of material, but the scrapers act on a smaller amount of excess which flows easily away. The effect of the preliminary scraping by the combs also tends to distribute the coating more uniformly on the width of the band, so that the various streaks 31 as they approach the scraper bars 10 are of about the same size and there does not tend to be more coating at one portion of the width than at another. It results that the final coating is more even in every way than if the guiding combs were not used.

If for any reason it is desirable that the coating on one surface be thicker than on the other, the guiding comb-bars can be adjusted so that the desired thicknesses are attained. The functions of the various parts would be as before described and the coatings would each be uniformly applied though of different thicknesses.

Having thus described my improved apparatus, what I claim as my invention is:

1. In apparatus for coating a band of sheet material, means for applying coating to the band, an element having a discontinuous surface contacting with the coated band and adapted to scrape the coating from portions only of the band as it leaves the coating applying means and a second element adapted to scrape and spread the coating remaining on the band.

2. In apparatus for coating a band of sheet material, means for applying coating material to the band, a toothed comb-bar for scraping portions only of the coating material from the band, and means for scraping and spreading the coating material remaining on the band.

3. In apparatus for coating a band of sheet material, means for applying coating material to the band, a pair of elements for scraping and spreading the coating on the band and between which the coated band may be drawn, and a pair of guides having surfaces to contact the band and between which the coated band may be drawn and adapted to center the band with respect to the bars, the contacting surfaces of the guides being discontinuous.

4. In apparatus for coating a band of sheet material, means for applying coating to the band, a pair of scrapers between which a band may be drawn from the coating applying means, and a pair of guides having surfaces adapted to contact the band as it is drawn from the coating applying means to the scrapers, the contacting surfaces being discontinuous.

5. In apparatus for coating a band of sheet material, a vessel for containing liquid coating material, a pair of scrapers between which a band may be drawn from the vessel and a pair of bars having teeth adapted to contact both sides of a band as it is drawn

from the vessel to the scrapers and to center the band with respect to the scrapers.

6. In apparatus of the class described, means for applying liquid coating material to both sides of a flexible band, a roll for drawing the coated band, a pair of toothed guiding bars between which the band is drawn by the roll, a pair of scraper bars between the guiding bars and the roll, the guiding bars and the roll being so located with respect to the scraper bars that the band will be drawn midway between the scraper bars.

7. In apparatus for coating both sides of a band of sheet material, comprising a coating vessel and a drying chamber, a pair of scrapers between the vessel and the chamber and a pair of toothed guides adapted to center a band of material with respect to the scrapers as it passes from the vessel to the chamber.

8. In apparatus for the purpose described, means for coating both sides of a flexible band, a pair of scrapers between which such a band may be drawn and a pair of adjustable, rigid, toothed bars adapted to contact both sides of the band as it approaches the scrapers and center it with respect to the scrapers.

9. In apparatus for the purpose described, means for coating both sides of a flexible band, a pair of adjustable, rigid scraper bars between which such a band may be drawn and a pair of toothed guides adapted to contact both sides of the band as it approaches the scraper bars and to center it with respect to the scraper bars.

10. The combination of means for applying liquid coating material to both sides of a flexible band, a pair of rigid, toothed bars, a pair of scrapers, and means for drawing a flexible band from the applying means between the bars and the scrapers, the toothed bars being adapted to contact both sides of the band and scrape portions of the liquid coating therefrom, and the scrapers being adapted to spread the coating evenly on both sides of the band.

11. The combination of means for applying liquid coating material to both sides of a flexible band, a pair of toothed bars, a pair of scrapers and means for drawing a flexible band from the applying means between the bars and the scrapers, the bars being adapted to contact both sides of the band and scrape portions of the liquid coating therefrom, leaving streaks of coating thereon, at the same time centering the band with respect to the scrapers, and the scrapers being adapted to spread the coating evenly on both sides of the band.

12. The combination of means for applying liquid coating material to both sides of a flexible band, a pair of rigid, adjustable toothed bars, a pair of rigid, adjustable scrapers and means for drawing a flexible band from the applying means between the bars and the scrapers, the bars being adapted to contact both sides of the band and center it with respect to the scrapers, and the scrapers being adapted to spread the coating evenly on both sides of the band.

13. In apparatus for coating sheet material, a vessel for containing liquid coating material, a guide roll in said vessel, a drying roll exterior to the vessel, a pair of adjustable scrapers between the rolls, a pair of adjustable centering bars with rigid teeth between the guiding rolls and the scrapers and near the scrapers, so that a band of sheet material may pass about said guide roll and thence in a straight path between the two bars and the two scrapers to the drying roll, the bars being so adjusted that they will scrape off some coating material from a band drawn between them, leaving streaks of such material and centering the band with respect to the scrapers, and the scrapers being so adjusted that they will spread such coating material evenly on the band passed between them.

14. The process of coating both sides of a flexible band, which consists in applying a liquid to both sides of a band, scraping longitudinal portions of the applied liquid from the band, and spreading the remaining liquid evenly over the surfaces of the band.

15. The process of coating both sides of a flexible band, which consists in passing the band through a bath, scraping off longitudinal portions of the liquid adhering to the band, leaving longitudinal streaks of liquid thereon and spreading the streaks evenly over the surfaces of the band, at the same time removing any excess liquid.

16. The process of coating both sides of a band of sheet material, which consists in passing the band through a bath, scraping off longitudinal portions of the adherent material from both surfaces of the band, spreading the remaining liquid evenly over the surfaces, and drying the band.

17. The process of coating a flexible band, which consists in applying a coating material to the band, scraping the applied material from portions only of the band and spreading the remaining material evenly over the surface of the band.

Signed at Rochester, New York, this 26th day of February 1918.

JOHN G. JONES.